on May 5, the former of which shows a tail 20 million miles long.

Some extraordinary phenomena were observed at Victoria (B.C.) at about 7 p.m. (local M.T.) on May 18. The sun appeared to be in a state of rotation, emitting bright flashes of light at frequent intervals. These were probably unusual refraction phenomena, possibly produced by the interposition of cometary matter, and are recorded by an octogenarian, Mr. Helmcken, who has never seen similar phenomena before.

In No. 8, vol. lxx., of the Monthly Notices there are more than a dozen papers dealing with observations of the comet's position, its physical characteristics, and its spectrum.

The *Rivista di Astronomia*, No. 6, contains some ancient records of the comet, reproduced by Father Stein, one of which shows that Halley's comet was observed in Italy for about fifty days in 1066; it became lost in the solar rays on April 19, and reappeared, as an evening star, on April 24.

THE ACCURATE MEASUREMENT OF PHOTOGRAPHS.—In all photographic astronomical researches the results are more or less vitiated by errors introduced by the optical apparatus, including the eye and brain of the observer, employed in their reduction. To eliminate these errors, Prof. E. C. Pickering proposes, in Harvard College Observatory Circular No. 155, the employment of an automatic registering apparatus. Briefly, he suggests that the negative to be measured be passed between a constant illumination and the two balanced arms of a bolometer. As the star image, or spectral line, comes in between the heat source and the bolometer, some heat would be cut off, and the galvanometer in the circuit would show a deviation, which could be registered automatically. The galvanometer curve would thus become a record of the positions and intensities of the star images or the lines in the spectrum, and the method, especially for spectrum work, should certainly be tried by someone having the necessary bolometric apparatus or selenium cells at their disposal.

OBSERVATIONS OF PERSEIDS IN 1909.—In No. 31, vol. iii., of the *Mitteilungen der Nikolai-Hauptsternwarte zu Pulkowo*, Herr S. Beljawsky describes the observations of Perseids made at Simëis on August 10, 11, and 12, 1909. The horary rates of the meteors observed on these three dates were 21, 60, and 17 respectively, and the positions of the radiants were 49°, +60° (5 obs.); 45°, +56° (15 obs.); and 43°, +55° (8 obs.), respectively. On August 11 there appeared to be another radiant at 62°, +16°, from which four meteors appeared to emanate, but the determination is uncertain.

RESULTS FROM THE MICROMETRIC OBSERVATIONS OF EROS, 1900.—During the opposition of Eros in 1900, a number of observers made micrometric comparisons between the planet and neighbouring stars. The results from a number of observatories have been reduced at Cambridge, and Mr. Hinks now discusses them in No. 8 of the Monthly Notices. The individual results agree generally, and give as the most probable value for the solar parallax $8{\cdot}806'' \pm 0{\cdot}004$.

WILD PLANTS ON WASTE LAND IN LONDON.

THE waste ground between Aldwych and the Strand has been colonised by a variety of plants, most of which show luxuriant growth. Many of the colonists have fruits or seeds adapted to wind distribution, as in the case of the winged fruit of the sorrel (*Rumex acetosa*), and of the plumed seeds of the hairy willow herb (*Epilobium hirsutum*) and French willow, or rose bay (*E. angustifolium*), by far the most conspicuous plant on the ground. It is of interest that *E. angustifolium*, which is absent in many of the waste places of London, occurs in the garden of Fountain Court, near the Strand. Among wind-distributed forms are also numerous Compositæ, the fruits of which are furnished with a pappus; these include the spear thistle (*Cirsum lanceolatum*), the groundsel (*Senecio vulgaris*) and its ally *S. viscosus*, the dandelion (*Taraxacem vulgare*), the butter bur (*Tussilago petastes*), and the Canadian fleabane (*Erigeron canadense*). Fruits and seeds of these various types might be blown with some readiness from neighbouring districts, or from one part of London to another.

To a varying extent, wind may be also efficient in carrying the seeds of hedge mustard (*Sisymbrium officinale*), London rocket (*S. irio*), which appeared in quantity after the Great Fire of 1666, and shepherd's purse (*Capsella bursa pastoris*); and the same is the case with chickweed (*Stelloria media*), white campion (*Lychius alba*), opium poppy (*Papaver somniferum*), a garden escape, frequently established in waste places, great plantain (*Plantago major*), pale persicaria (*Polygonum lapathifolium*), and scentless mayweed (*Matricaria inodorata*). In several of the above the seed is small or flattened, but it is not elaborately adapted to wind dispersal, and it may be questioned whether wind alone will account for the presence of these plants. A probable auxiliary exists in the sparrow, through the alimentary canal of which various seeds and fruits no doubt pass, and it is not unlikely that others become attached to its feet by means of the sticky London mud. It will be remembered that Darwin in the "Origin of Species" describes eighty-two plants as springing from the earth obtained from the feet of a single partridge. This method of distribution no doubt accounts for the presence of Dutch or white clover (*Trifolium repens*) and of two balsams, the pink-flowered *Impatiens glandulifera* and a white variety. The explosive fruit characteristic of this genus could certainly not shoot its seeds across the traffic of a London street. Possibly cats may be effective as agents of distribution in this case, and they may also account for the presence of cleavers (*Galium Aparine*), the hooked fruits of which would readily cling to their fur.

Among garden escapes, the marigold, nasturtium (=Tropæolum), wallflower, and a species of Prunus can be observed, as well as the opium poppy mentioned above; in connection with these, and with many of the wild species also, the neighbourhood of Covent Garden must be recalled.

The above list is by no means exhaustive, none of the grasses, for instance, having been mentioned; in one or two cases the identification had to be made from a distance and through the fence surrounding the waste ground.

AGRICULTURAL INVESTIGATIONS IN EGYPT.[1]

SEVERAL important events are chronicled in the current "Year-book of the Khedivial Agricultural Society." The scope of the society has recently been extended by the formation of a section dealing with farm animals, the object of which is to effect as much improvement as possible in the livestock of the country. Twenty stallions have already been distributed over the country, a number of selected cows have been acquired from which good stud bulls can in time be sent out, and a herd of buffaloes has been purchased with a view to the establishment of a heavy milking strain. In addition, an experimental farm of about 160 acres has been acquired near Cairo, and an arrangement has been effected with the State Domains Administration whereby a considerable tract of land is to be set aside for the raising of cotton or wheat seed of good quality. Finally, the society has directed attention to the diminished yield of cotton in proportion to the area sown. A committee was appointed to investigate the matter, and has already issued a report.

A considerable proportion of the year-book is taken up by Mr. Lawrence Balls's studies of Egyptian cotton. A detailed account is given of the results of a single cross made in 1905 between Afifi and Truitt Big Boll. The fourth generation is now growing, and, although the cross has no special economic value, and the results are in some ways incomplete, the record is a very valuable one, and throws much light on production of cotton varieties on Mendelian lines. The synthesis of a commercially useful cotton is a tedious business. Desirable characters are mostly dominant over undesirables, except where the

[1] The Year-Book of the Khedivial Agricultural Society, Cairo, 1909. Pp. xv+239. (Glasgow: The University Press, 1910.) The Cairo Scientific Journal. Vol. iv., No. 43.

heterozygote is intermediate. Experimental difficulties are considerable. The plants are large, the flowers are not entirely self-fertilised, and some of the characters fluctuate considerably. Numerous pests attack the plants, including aphides, boll worm, and the cotton stainer bug, while two fungi, the "sooty mould" and "sore-shin," do great damage. An advantage, however, is that the cotton plant can be grown as perennial by simply cutting it back; in this way a further supply of seed from a particular plant can always be obtained if necessary.

Bees appear to be the chief agents in effecting cross-pollination, and they have to be excluded by mosquito nets covering the whole plant; there appears to be no wind-fertilisation. Before these nets were used, the preparation of self-fertilised seed was laborious and uncertain. Tissue-paper bags were employed for separate flowers, but a large proportion of the bagged flowers were shed. Now the operation is simplified. The flowers are castrated at 4 a.m. and cross-pollinated at 9 a.m. No bags are necessary if the other open flowers under the net are removed, except, of course, to cover the flower from the plant which is to be employed as the male parent.

The results are worked out in detail for a number of unit characters, and are plotted on curves. The data thus obtained are not only interesting in themselves as a study of a Mendelian problem, but are of distinct practical value for the cotton breeder.

Mr. Balls also writes on the general position of the cotton crop in Egypt, and gives a number of interesting historical details. It is not certain how or when cotton was first cultivated in Egypt. The old mummy cloths are of flax. Apparently no distinct allusion to cotton occurs until the time of Pliny, and there is nothing to show that cotton was cultivated before 200 B.C. No definite historical account can be given until the time of Jumel, a French engineer who, in the early years of the last century, recognised the possibilities of Egyptian cotton and made plans for extending and improving its cultivation. Importation of Sea Island cotton began in 1822 and went on for many years; Mr. Balls's view is that the present Egyptian cottons are hybrids between the brown-linted tree types associated with Jumel and Sea Island cotton. He further thinks that, for the future, it is necessary to evolve strains which mature early and are therefore not likely to suffer from the boll-worm, and which yield heavily, so as to compensate for the decreased production per acre which is now setting in.

This falling off in productivity makes a very pretty problem unlike any we know of elsewhere. Fifteen years ago the yields ran about 5·5 cantars per feddan; of late years they are only 4·5. There are, of course, many conceivable explanations duly set out in the report of the commission in the present volume and meriting further examination, but it is suggested that part of the trouble arises from a rise in the subsoil water following on the rise brought about in the Nile by the barrage schemes. On this question Mr. Lucas has something to say in the *Cairo Scientific Journal*. He tabulates the minimum water-level in certain wells, and shows that in these cases there has been a rise of more than 1 metre since 1894. Other factors have to be taken into consideration, and many further measurements will be required, but the scientific interest and practical importance of the problem can hardly be overrated.

Mr. Hughes gives an account of manurial trials on cotton, and we are pleased to see that he gives full mechanical and chemical analyses of the soils on lines accepted in Great Britain. A considerable amount of trouble is involved, but the results are of much wider value in consequence. Mr. Willcocks describes the insects injurious to stored grains, seeds, &c. In the *Cairo Scientific Journal* Mr. Fletcher describes an experiment in which maize was grown for ten days in soils heated, respectively, to 95° C. and 170° C., and which he considers inconsistent with the work of Russell and Hutchinson. Mr. Fletcher accepts Whitney's hypothesis that soils contain a toxin injurious to plants, but put out of action by heat, an hypothesis much too controversial to be discussed here. No account appears to have been taken of the marked chemical decomposition of soil substances at the high temperature of the experiment.

SCIENCE IN BENGAL.

THE Journal and Proceedings (new series) of the Asiatic Society of Bengal has become a veritable miscellany—a very doubtful improvement upon the old arrangement followed by the Society, of publishing papers on philology and archæology, natural science, and ethnology, in three distinct and independent "parts," and of relegating matters of domestic and colloquial interest to the Proceedings.

The latest issues (Nos. 5–11 of vol. iv.) include thirty papers, in which Hindu mythology, numismatics, natural history both of the formal and of the discursive kind, archæology, geography, higher mathematics, lists of Oriental MSS., botany, epigraphy, and Indian history keep the strangest and most bewildering company with fragments of chemistry, philology, and geology, and with obituary notices and other domestic records.

Many of the papers deal with speculations rather than with matters of verifiable fact, and of these one of the most reasonable and most generally interesting is that by Mr. G. R. Kaye, on the use of the abacus in ancient India. The author examines, and expresses himself far from satisfied with, the evidence offered in support of the belief that the abacus was used in India in ancient times; and he is not at all disposed to accept without question the view that the Arabs borrowed their notation, which forms the basis of the science of arithmetic, from the Hindus.

The noteworthy papers on natural science are three in number. In one, Dr. N. Annandale describes a recent Himalayan species of a Psychodid fly of the genus Diplonema, a genus that "appears to have been known hitherto from three Tertiary species which occur in Baltic amber and from one Quaternary form in fossil copal." Another paper, by Mr. P. Bruhl, on recent plant immigrants into Bengal and Bihar, is a laborious compilation of considerable value, although, as the author includes cultivated plants as well as weeds, the title is a little disappointing; 234 phanerogams are enumerated and classified according to their systematic position and their land of origin, the result showing that 54·7 per cent. of them have been derived from America. Of these 234 species, however, only thirty-seven are entirely wild, and so are true, unassisted (or, at any rate, not deliberately introduced) immigrants; all the others are either cultivated or can be traced to cultivation. A third paper, by Colonel Prain and Mr. Burkill, describes seventeen new species of yams from China and neighbouring countries to the south, the descriptions, which are in Latin, being models of clearness and conciseness.

The twenty-first instalment of the late Sir George King's "Materials for a Flora of the Malayan Peninsula" is happily distinguished by appearing as an independent "extra number" of the old series of the Society's journal. It treats of the Gesneraceæ and Verbenaceæ. Of the former order, 131 species, distributed in twenty genera, are described by Mr. H. N. Ridley; of the latter order, seventy-two species, belonging to fifteen genera, are dealt with by Mr. J. S. Gamble.

We have also received Nos. 5–9 of the second volume of the new Memoirs of this society.

No. 5 of these is a most learned and interesting treatise (which is to be continued) on Mundari poetry, by Father J. Hoffmann. The Mundas are one of the aboriginal tribes of Central India, and a large remnant of them is isolated in the hills of Chota Nagpur. "Their world is a narrow circle of villages hidden away in forest-clad mountains . . . and they are quite content to leave . . . its wonders to such races as may care for them. Their only desire . . . is to be left alone." They are entirely illiterate, and know nothing about any alphabet. If they did, one would suggest that the sixteenth ode of the second book of Horace might be translated into their language as a good reflection of their views of life; but their own poetry, which is meant to be sung, does not touch the skirts of divine philosophy: it deals with the simplest of perennial themes, such as first love, friendship, maiden vanity, the pleasures of the chase, and the goodness of the good old customs, or, on the other hand, blighted affection, the pangs of hunger, and the terrors of the jungle. According to Father Hoffmann, their simple lyrics